

REMARKS

By this Amendment, claims 1 and 11 have been amended. Accordingly, claims 1-20 are pending in the present application. Of these pending claims, claims 2-5, 7-10, 12-15 and 17-20 have been withdrawn due to a species restriction requirement.

The drawings have been objected to as not showing the subject matter of claim 11. Applicant respectfully submits that the subject matter of claim 11 is fully disclosed in Fig. 1 of the present application. Claim 11 covers the structure of Fig. 1 beginning from the output side of the depicted band-pass filter. Accordingly, as the subject matter of claim 11 is fully shown in the drawings, reconsideration and withdrawal of this objection is respectfully requested.

Claims 1 and 11 stand rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,518,854 to Kayano et al. Applicant respectfully traverses this rejection.

Among the limitations of independent claims 1 and 11 which are neither disclosed nor suggested in the prior art of record is a band-pass filter which includes “a plurality of j resonators” and “wherein a number of transmission lines in the band-pass filter is equal to $j-1$ in a substantially $\lambda/2$ line equivalent.” This structure is neither disclosed nor suggested in the prior art of record.

One of the purposes of the present invention is to provide a parallel multi stage band-pass filter which is constructed using less parts than prior art multi stage band-pass filters, i.e., a lesser number of phase shift circuits. With the present invention as defined in independent claims 1 and 11, the number of transmission lines is one less than the number of resonators, thus reducing the required number of components needed to form the band-pass filter.

In prior art band-pass filters, a $\lambda/2$ transmission line could not simply be inserted or removed, because when inserted, the phase in front of the inserted line at a certain frequency is reversed compared to that before insertion. As such, in traditional band-pass filters, additional phase shift circuitry is required so that the phase shift can be reversed between blocks of the circuit having resonant-frequency bands adjacent to each other, and so that each block may be directly connected to an input-output terminal.

Kayano et al. discloses in Fig. 18 a filter circuit which includes a plurality of resonators 115-117 and a corresponding number of delay circuits 118-120. However, the number of delay units is equal to the number of resonators. In addition, Kayano can be applied only when there is a direct connection to an input-output terminal.

While Wakino et al. discloses a multi-stage band-pass filter, it is completely different than that of the present invention. In Wakino, additional phase shift circuits such as a transmission line and a delay line are required for every block added to the circuit, as well as one additional phase shift circuit for every two blocks in order to reverse the phase shift. Such increase in the number of phase shift circuits will bring about various problems.

Applicant wishes to also point out that the structure of the band-pass filter disclosed in Wakino et al. is similar to that of the prior art shown in Fig. 23 of the present application. In particular, there are more transmission lines than there are resonators in the structure of Wakino et al. Thus, Wakino et al. neither teaches nor suggests the present invention as defined in independent claims 1 and 11. In fact, inasmuch as Wakino et al. teaches that the number of transmission lines is greater than the number of resonators, it teaches away from the present invention.

Dao does not remedy any of the deficiencies of Kayano et al. or Wakino et al. There is nothing within Dao which teaches or suggests making the number of transmission lines less than the number of resonators.

Therefore, even if one were to combine the teachings of Kayano et al., Wakino et al. and/or Dao, one would not arrive at the present invention as defined in independent claims 1 and 11. At best, one would arrive at a band-pass filter having an equal number of transmission lines than resonators or more transmission lines than resonators. Accordingly, it is respectfully submitted that independent claims 1 and 11 patentably distinguish over the art of record.

Claim 6 depends directly from independent claim 1 and includes all of the limitations found therein. Claim 16 depends directly from independent claim 11 and includes all of the limitations found therein. Each of these dependent claims include additional limitations which, in combination with the limitations of the claims from which they depend, are neither disclosed nor suggested in the art of record. Accordingly, claims 6 and 16 are likewise patentable.

In addition, it is respectfully submitted that independent claim 1 is generic to the embodiments of dependent claims 2-5 and 7-10, and that independent claim 11 is generic to the embodiments of dependent claims 12-15 and 17-20. Thus, it is respectfully requested that dependent claims 2-5, 7-10, 12-15 and 17-20 be considered and allowed along with independent claims 1 and 11.

In view of the foregoing, favorable consideration of the amendments to claims 1 and 11, and allowance of the present application with claims 1-20 is respectfully and earnestly solicited.

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Respectfully submitted,

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